

CLAIMS:

What is claimed is:

1. A process for the hydroformylation of compounds having olefinic unsaturation using synthesis gas in the presence of a cobalt catalyst, including a demetalling step wherein essentially all the cobalt from the hydroformylation reaction is recovered as cobalt acetate and/or cobalt formate and the cobalt recycle process to hydroformylation does not include a step where the cobalt is transferred using a vapor stream carrier, the improvement comprising concentrating an aqueous stream comprising cobalt acetate and/or formate from the demetalling step in an evaporator under conditions sufficient to cause a stream of distillate comprising acetic and/or formic acid and water to distill overhead from the evaporator and withdrawing, as bottoms from the evaporator, a concentrated cobalt acetate and/or cobalt formate solution.
2. The process according to Claim 1, wherein the stream of distillate comprises acetic acid and water and the bottoms from the evaporator comprises a concentrated cobalt acetate solution.
3. The process according to Claim 1 or 2, further comprising a stage after said concentration stage, wherein said distillate is separated into an acid-depleted stream and a concentrated acid stream.
4. The process according to Claim 3, wherein said distillate is separated into an acid-depleted stream and a concentrated acid stream by reverse osmosis using a polymeric membrane.
5. The process according to Claim 1 or 2, wherein an organic phase comprising an aldehyde is separated from an aqueous phase comprising cobalt salt in said demetalling step and passed to a wash tower, where it is washed with at least a portion of said acid-depleted stream.

6. The process according to Claim 1 or 2, further comprising a precarbonylation or catalyst makeup stage and an oxonation stage, and wherein at least a portion of said concentrated cobalt salt from said evaporator is recycled back into at least one of said precarbonylation or catalyst makeup stage and said oxonation stage.
7. The process according to Claim 1 or 2, wherein the olefinic material that is hydroformylated is made by oligomerizing a lower olefinic material over a siliceous acidic monodimensional zeolite selected from ZSM-22 and ZSM-23 having acidic pore activity and surface neutralized with 2,4,6-collidine.
8. The process according to Claim 1 or 2, wherein the olefinic material that is hydroformylated is made by a process selected from the Octol ® process, the Dimersol® process, an oligomerization process using a solid phosphoric acid catalyst.
9. The process according to Claim 3, wherein the concentrated acid stream is recycled to be used in the demetalling stage.
10. The process according to Claim 6, wherein said precarbonylation stage and said oxonation stages are combined so that the hydroformylation reaction occurs in a single vessel comprising two phases, one phase comprising cobalt salt and the other phase comprising an oil-soluble cobalt form.
11. The process according to Claim comprising:
 - (a) providing said cobalt to form an oil-soluble cobalt carbonylation catalyst;
 - (b) reacting the synthesis gas and said compounds having olefinic unsaturation in the presence of said cobalt carbonylation catalyst under hydroformylation conditions to produce a mixture comprising an aldehyde;

- (c) injecting said distillate comprising aqueous acetic and/or formic acid and water, optionally together with an oxidant, into said mixture to make an organic phase comprising said aldehyde and an aqueous phase comprising greater than 70% of said cobalt as an organic cobalt salt;
- (d) passing said aqueous phase to an evaporator wherein said distillate comprising said acetic and/or formic acid and water is taken overhead and a bottoms fraction comprising said concentrated cobalt salt is removed from the evaporator;
- (e) recycling said cobalt salt to supply said cobalt in step (a); and
- (f) recovering said aldehyde.